

FROM THE HINDAS PROJECT: EXCITATION FUNCTIONS FOR RESIDUAL NUCLIDE PRODUCTION BY PROTON-INDUCED REACTIONS

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The results reported here were obtained by proton irradiation experiments with classical kinematics. These investigations are complimentary to those using inverse kinematics where the primary residuals can be studied in detail at certain energy points. Experiments with classical kinematics are restricted to residual nuclides with usually at least a few hours' half-lives, but allow studying the complete excitation functions from thresholds up to the highest energies. For proton-induced reactions, our experiments aimed to further developing and completing the cross section database which was established by our collaboration in recent years. It was extended to the heavy target elements Ta, W, Pb, and Bi for energies up to 2.6 GeV. In addition, new measurements for the target element iron were performed up to 2.6 GeV. For the target element lead, a comprehensive set of excitation functions published recently was completed by AMS-measurements of cross sections for the production of the long-lived radionuclides Be-10, Al-26, Cl-36, and I-129 and by mass spectrometric measurements of for stable and radioactive rare gas isotopes of He, Ne, Ar, Kr, and Xe. Residual nuclide production from natural uranium was investigated for energies from 21 MeV to 69 MeV. Comprehensive tests of the nuclear reaction codes TALYS and INCL4+ABLA, which were developed within the HINDAS project, were performed with the new experimental results for the target elements Fe, Ta, W, Pb, Bi, and U for the entire energy range.